CLAIMS

1. A dc-ac converter, comprising:

a dc power supply;

a transformer having a primary winding and at least one secondary winding;

a semiconductor switch circuit for passing a current alternately in a first direction and a second direction from said dc power supply to said primary winding;

a load connected to said secondary winding;

a current detection circuit for detecting the current flowing through said load to generate a current detection signal indicative of the current detected;

a PWM triangular wave signal generation circuit for generating a triangular wave signal for use in PWM (said triangular wave signal referred to as PWM triangular wave signal);

a PWM control signal generation circuit for generating a PWM control signal upon receipt of said PWM triangular wave signal and current detection signal by

generating an error signal based on said current detection signal; and

comparing said error signal and PWM triangular wave signal to generate said PWM control signal; and

an intermittent operation control circuit for setting the level of said error signal to substantially zero based on an intermittent operation signal during an off-duty period of said intermittent operation, wherein

said semiconductor switch is switched on and off in accordance with

said PWM control signal.

2. The dc-ac converter according to claim 1, wherein said PWM control signal generation circuit includes:

an error signal generation circuit for generating an error signal based on the difference between said current detection signal and a reference current signal;

a PWM signal comparator for comparing said PWM triangular wave signal and error signal to output said PWM control signal, and wherein

said intermittent operation control circuit includes an intermittent operation control element connected to said error signal generation circuit and switched on and off by said intermittent operation signal in a controlled manner, wherein the level of said error signal becomes substantially zero during each off-duty period.

3. The dc-ac converter according to claim 2, wherein

said error signal generation circuit outputs said error signal based on the error output generated by an error amplifier that compares said current detection signal with said reference current signal, and

said intermittent operation control circuit sets the level of said current detection signal to be supplied to said error amplifier at a predetermined magnitude to thereby make the magnitude of said error signal equal to substantial zero.

4. The dc-ac converter according to claim 3, further comprising a feedback capacitor connected between the output end of said error signal generation

circuit and the input end of said error amplifier to cause said error signal to change slowly in a shift between an on-duty period and off-duty period of said intermittent operation.

5. A dc-ac converter, comprising:

a dc power supply;

a transformer having a primary winding and at least one secondary winding;

a semiconductor switch circuit for passing a current alternately in a first direction and a second direction from the dc power supply to the primary winding;

a load connected to the secondary winding;

a current detection circuit for detecting the current flowing through the load to generate a current detection signal indicative of the current detected;

a voltage detection circuit for detecting the voltage impressed on the load to generate a voltage detection signal indicative of the voltage detected;

a PWM triangular wave signal generation circuit for generating a triangular wave signal for use in PWM (said triangular wave signal referred to as PWM triangular wave signal);

a PWM control signal generation circuit for generating a PWM control signal upon receipt of said PWM triangular wave signal, current detection signal, and voltage detection signal by

generating an error signal based on said current detection signal and voltage detection signal; and

comparing said error signal and PWM triangular wave signal

to generate said PWM control signal; and

an intermittent operation control circuit for setting the level of said error signal to substantially zero based on an intermittent operation signal during each off-duty period of said intermittent operation, wherein

said semiconductor switch is switched on and off in accordance with said PWM control signal.

6. The dc-ac converter according to claim 5, wherein said PWM control signal generation circuit includes:

an error signal generation circuit for automatically selecting, and outputting as said error signal, one of said current error signal and voltage error signal in accordance with the magnitudes of said current error signal and voltage error signal, said current error signal generated based on the difference between said current detection signal and a reference current signal, and said voltage error signal generated based on the difference between said voltage detection signal and a reference voltage signal; and

a PWM signal comparator adapted to compare said PWM triangular wave signal with said error signal to generate said PWM control signal, wherein

said intermittent operation control circuit is connected to said error signal generation circuit and includes an intermittent operation control element that is switched on and off in accordance with said intermittent operation signal such that the level of said error signal reduces to substantially zero in off-duty periods of said intermittent operation.

7. The dc-ac converter according to claim 6, wherein

said error signal generation circuit may include:

a first error amplifier for comparing said current detection signal and said current reference signal to generate a first error output;

a second error amplifier for comparing said voltage detection signal and said reference voltage signal to generate a second error output;

a first control element controlled by the first error output; and

a second control element controlled by the second error output, wherein the output ends of the first and second control elements are connected with each other to output the error signals from the node thereof (said node referred to as interconnection node), and

said intermittent operation control circuit is adapted to set either the current detection signal supplied to said first error amplifier or said second error signal supplied to said second error amplifier to a predetermined level to thereby lowering the error signal to substantial zero.

8. The dc-ac converter according to claim 7, further comprising:

a first feedback capacitor connected between said interconnection node and the input end of said first error amplifier receiving said current detection signal; and

a second feedback capacitor connected between said interconnection node and the input end of said second error amplifier receiving said voltage detection signal, thereby allowing said error signal to change slowly in a shift between an on-duty and an off-duty period of said intermittent operation.

9. The dc-ac converter according to claim 1 or claim 5, further comprising a

triangular wave signal generation circuit (intermittent operational triangular wave signal generation circuit) for generating a triangular wave signal for intermittent operation of said intermittent operation control element and a comparator for comparing said intermittent operational triangular wave signal with a duty signal to generate said intermittent operation signal in accordance with the comparison.

10. The dc-ac converter according to claim 1 or claim 5, wherein said load is a cold cathode fluorescent light.

11. A controller IC for driving a semiconductor switch circuit to control ac power supplied to a load, comprising:

a PWM triangular wave signal generation block, connected to an external capacitor (oscillation capacitor) and a resistor (oscillation resistor) for establishing oscillation, for generating a PWM triangular wave signal;

a PWM control signal generation circuit for generating a PWM control signal, said PWM control signal generation circuit adapted to

receive said PWM triangular wave signal, a current detection signal obtained by detecting the current flowing through said load and a voltage detection signal obtained by detecting the voltage across said load;

generate an error signal based on said current detection signal and voltage detection signal;

compare said error signal with said PWM triangular wave signal to generate said PWM control signal; and

an intermittent operation control circuit for setting the level of said error signal to substantially zero based on an intermittent operation signal

during each off-duty period of the intermittent operation, wherein

said semiconductor switch is switched on and off in accordance with said PWM control signal.

12. The controller IC according to claim 11, further comprising;

an intermittent operation triangular wave signal generation circuit, connected to an external oscillation capacitor, for generating a triangular wave signal for performing intermittent operation (said signal referred to as intermittent operation triangular wave signal); and

a comparator for comparing said intermittent operation triangular wave signal and a duty signal to generate said intermittent operation signal in accordance with the comparison.

13. The controller IC according to claim 11, wherein

said PWM control signal generation circuit includes:

an error signal generation signal for outputting said error signal by selecting as said error signal one of a current error signal and a voltage error signal in accordance with the magnitude of said current error signal and said voltage error signal, said current error signal formed on the basis of the difference between said current detection signal and a reference current signal while said voltage error signal formed on the basis of the difference between said voltage detection signal and a reference voltage signal; and

a PWM signal comparator for comparing said PWM triangular wave signal and error signal to output said PWM control signal, and wherein said intermittent operation control circuit includes an intermittent operation

control element that is connected to said error signal generation circuit and switched on and off in a controlled manner, wherein the level of said error signal becomes zero during each off-duty period of the intermittent operation.

14. The controller IC according to claim 13, wherein

said error signal generation circuit includes:

a first error amplifier for comparing said current detection signal and said current reference signal to generate a first error output;

a second error amplifier for comparing said voltage detection signal and said reference voltage signal to generate a second error output;

a first control element controlled by said first error output; and

a second control element controlled by the second error output, wherein

the output ends of said first and second control elements are connected with each other to output said error signals from the node thereof (said node referred to as interconnection node), and wherein

said intermittent operation control circuit is adapted to set either said current detection signal supplied to the first error amplifier or said second error signal supplied to the second error amplifier to a predetermined level to thereby substantially nullifying the error signal.

15. The controller IC according to claim 14, further comprising:

a first feedback capacitor connected between said interconnection node and the input end of said first error amplifier receiving said current detection signal: and

a second feedback capacitor connected between said interconnection

node and the input end of said second error amplifier receiving said voltage detection signal, thereby allowing said error signal to change slowly in a shift between an on-duty and an off-duty period of said intermittent operation.

16. The controller IC according to claim 15, wherein

said first and second feedback capacitors are external capacitors, and

said controller IC further comprises

feedback terminals for connection with the respective ends of said first and second capacitors;

input terminals for connection with the other ends of said first and second feedback capacitors and for respectively receiving said current detection signal and voltage detection signal to be respectively inputted to said first and second error amplifiers.